

## PowerPractice Essentials | Lee

### Part 1

- 1) Dimensional Analysis
- 2) Accuracy and Precision
- 3) Significant Figures
- 4) Isotope Notation and Percent Abundance
- 5) Naming Ionic Compounds I: Binary
- 6) Naming Molecular Compounds
- 7) Basic Molar Conversions

### Part 2

- 8) Balancing Equations, basic
- 9) Naming Ionic Compounds II: Tertiary
- 10) Percent Composition
- 11) Types of Reactions
- 12) Mole Ratios, basic
- 13) Stoichiometry

### Part 3

- 14) Pressure Conversions
- 15) Three Basic Gas Laws
- 16) Specific Heat Capacity ( $q=mc\Delta t$ )
- 17) Molar Heat / Phase Changes
- 18) Electron Configurations
- 19) Ideal Gas Law & Real Gas Deviation from Ideal
- 20) Combined Gas Law

### Part 4

- 21) Dalton's Law of Partial Pressures; Graham's Law of Effusion
- 22) Reading Potential Energy Diagrams
- 23) Empirical Formula; Determining Molecular Formulas
- 24) Molarity I: Beginner
- 25) Molarity II: Intermediate
- 26) Acids and Bases I: Beginner
- 27) Acids and Bases II: Intermediate

### Part 5

- 28) Nuclear Equations
- 29) Half Lives
- 30) Le'Chatelier's Principle
- 31) Spontaneity
- 32) Organic Chemistry I: Introduction
- 33) Organic Chemistry II: Functional Groups
- 34) Reduction-Oxidation



**PowerPractice Essentials #2: ACCURACY AND PRECISION**  
**Chemistry | Lee**

Four new machines have been developed by different companies to test the concentration of a lead (Pb) in the drinking water of a city. The concentration of lead is measured in ppb (parts per billion), and high-quality lab tests have determined that the true Pb concentration is 15.4 ppb. Here is the data from the different machines from three different trials.

	<b>WaterWiz 3000</b>	<b>Safe Sip</b>	<b>ProTest ZQ</b>	<b>T-Micro Kit</b>
<b>Trial 1</b>	15.6 ppb	14.8 ppb	13.9 ppb	15.4 ppb
<b>Trial 2</b>	15.9 ppb	15.8 ppb	14.2 ppb	12.7 ppb
<b>Trial 3</b>	17.2 ppb	15.3 ppb	14.4 ppb	14.8 ppb
<b>Mean (Average)</b>				
<b>Range</b>				

- 1) Determine the mean and range for the concentration data that each machine provided, considering all trials.
- 2) Which machine is the most precise?
- 3) Which machine is the least precise?
- 4) Which machine is most accurate?
- 5) Which machine is least accurate?
  
- 6) To determine *accuracy*, use the \_\_\_\_\_ of the data, and see how close it is to the true (actual) value.
- 7) To determine *precision*, use the \_\_\_\_\_ of the data. It will be smaller for more precise measurements.

**PowerPractice Essentials #3: SIG FIGS**  
**Chemistry | Lee**

1) Density = Mass / Volume.

The mass of a mineral is 3.565 g, and the volume is 2.8 cm<sup>3</sup>. Determine the density of the mineral using correct sig figs.

2) A construction worker cuts a section of wood to be 9.45 feet long.

His partner cuts another section of wood that she measured to be about 12 feet long. They glue the two sections together to create a single piece. How long is the combined section?

3) Jacob and his twin brother Jim build rectangular gardens for their landscaping business. Jacob meticulously measures the length of the garden below to be 13.25 meters long. Jim was in a hurry to get home for his son's birthday, and quickly measures the width to be about 21 meters wide.

a. Determine the area, in m<sup>2</sup>, of the garden. Be sure to use correct sig figs.

b. What is the perimeter of the garden in correct sig figs?

c. It costs \$2.50 to fertilize 10 m<sup>2</sup> of a garden. Calculate the approximate cost to fertilize this garden, rounded *up* to the nearest \$20.

**PowerPractice Essentials #4: ISOTOPES**  
**Chemistry | Lee**

1) Determine the number of neutrons, protons, and electrons in each of the following *neutral* isotopes.

a. Carbon-14

c.  $^{56}\text{V}$

b.  $^{106}_{46}\text{Pd}$

d. Arsenic-75

2) Write the isotope notation for the following species:

a. An isotope with 52 neutrons and 40 protons

b. An isotope with 58 protons and 83 neutrons

c. An isotope with 58 protons and 81 neutrons

3) Circle the isotope that has the most neutrons:

$^{56}\text{Fe}$

$^{54}\text{Mn}$

$^{56}\text{Ni}$

$^{58}\text{Co}$

4) Rubidium is a soft, silvery-white metal that has two common isotopes,  $^{85}\text{Rb}$  and  $^{87}\text{Rb}$ . If the abundance of  $^{85}\text{Rb}$  is 72.2% and the abundance of  $^{87}\text{Rb}$  is 27.8%, what is the average atomic mass of rubidium?

5) An unknown element (symbol Uk) has the following isotopes with their relative abundances:

Uk-66            45.5%

Uk-67            33.0%

Uk-70            21.5%

Determine the approximated weighted average atomic mass for the unknown element.

**PowerPractice Essentials #5: NOMENCLATURE – BINARY IONIC  
Chemistry | Lee**

1) Determine the name of the following compounds:



2) Determine the name of the following compounds. The cation may be a transition metal.



3) What is the formula for the following ionic compounds?

a. Palladium(III) chloride

d. Tin(II) oxide

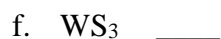
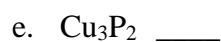
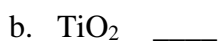
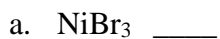
b. Lithium sulfide

e. Lead(IV) oxide

c. Calcium phosphide

f. Lead(IV) fluoride

4) Write the oxidation state of the metal cation on the line:

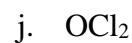
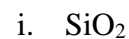
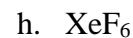
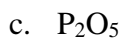


**PowerPractice Essentials #6: NOMENCLATURE – MOLECULAR/COVALENT  
Chemistry | Lee**

- 1) A molecular (or covalent) compounds is made of two or more \_\_\_\_\_.
- 2) Provide the numerical prefix for each number:

One	Two
Three	Four
Five	Six
Seven	Eight
Nine	Ten

- 3) Determine the name of the compound, given the formula:



- 4) Write the formula for the compound, given the name:

a. Dinitrogen monoxide

d. Sulfur hexabromide

b. Nitrogen trihydride (commonly called *ammonia*)

e. Diselenium diiodide

c. Trisilicon tetranitride

f. Carbon tetrachloride

**PowerPractice Essentials #7: BASIC MOLAR CONVERSIONS**  
**Chemistry | Lee**

- 1) How many particles is one mole? Write it in scientific notation: \_\_\_\_\_
- 2) One dozen is 12 things.
  - a. How many eggs does a farmer have if she has 7.5 dozen?
  
  - b. How many dozen is 94 eggs?
  
  - c. One egg costs \$0.18, so how much money does 9 dozen eggs cost? Use dimensional analysis.
- 3) One mole is \_\_\_\_\_ particles (such as atoms, molecules, electrons, etc.)
  - a. How many moles does a chemist have if he has  $7.5 \times 10^{24}$  atoms?
  
  - b. How many iron atoms is 2.23 moles?
  
  - c. How many helium atoms is 7.80 moles?

Using Molar Mass (g/mol):

- 4) What is the molar mass of dinitrogen monoxide ( $\text{N}_2\text{O}$ ) gas?
  - a. A dentist uses 5.33 mol  $\text{N}_2\text{O}(g)$  one day. Determine the mass of  $\text{N}_2\text{O}(g)$  used, in grams.
- 5) What is the molar mass of methane ( $\text{CH}_4$ ) gas?
  - a. A chef uses 6.40 grams of  $\text{CH}_4(g)$  one day. Determine the number of moles of  $\text{CH}_4(g)$  used.
- 6) Diamonds are pure carbon. Billy has a diamond that has a mass of 0.887 g.  
How many carbon atoms are inside his diamond?
- 7) A microbiologist needs 0.0224 g of ribose ( $\text{C}_5\text{H}_{10}\text{O}_5$ ) for a cellular biology experiment.
  - a. Determine how many moles of ribose this is.
  
  - b. How many molecules of ribose is this equivalent to?